

- 28 -

ABSTRACT

A near-field scanning optical microscope (NSOM) laser micromachining system for laser machining features on surfaces using an ultrafast laser source and a method of laser machining such features. The system includes: the ultrafast laser source to generate
5 pulses of laser light having pulse durations less than 1 ns and a peak wavelength; an NSOM probe having a substantially cylindrical shape; an NSOM mount to controllably hold the NSOM probe and the microstructure workpiece to be machined; an NSOM probe monitor coupled to the NSOM mount for determining the distance between the probe tip of the NSOM probe and the surface; and an NSOM controller coupled to the NSOM probe
10 monitor, and motion stages in the NSOM mount. The NSOM mount includes an XY motion stage and a Z motion stage. These motion stages are couple to either the NSOM probe or the microstructure workpiece, or one motion stage to each.